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A group of 46 five-year olds, 24 girls and 22 boys, and 21 four-year olds, 11 girls and 10 boys, participated in a study to determine the styles of categorization employed by preschool and kindergarten children. Four categorizing styles were defined and used in the study: Descriptive Part-Whole--e.g., classifying human figures because "they all have feet"; Descriptive Global or total objective similarities--e.g., grouping male figures because "they are all men"; Relational-Contextual or denoting functional interdependence between elements in an array--e.g., selecting a picture of a horse and a picture of a stagecoach because "a horse is used to pull a stagecoach"; Categorical-Inferential or classification on the basis of inferred characteristics including function, class membership, particular attributes, or geographical location.

Results of the study indicated that styles of categorization found with older subjects (young adults) occurred also with the young children. The descending order of frequency of styles was Descriptive Part-Whole, Relational-Contextual, Categorical-Inferential, and Descriptive-Global. A similar pattern appeared for boys and girls at ages four and five, with the exception that boys, tended to use functional labels or labels denoting occupation more frequently. A study of intellectual correlates revealed that I.Q. does not significantly relate to any stylistic category for boys. For girls, a positive relationship was obtained between IQ and a class-naming type response. Personality correlates of stylistic approaches were found. The boys' descriptive part-whole responses related to relaxed attitudes and emotional control; the girls tended to day dream and to be non-cautious.

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STYLES OF CATEGORIZATION AND THEIR PERCEPTUAL, INTELLECTUAL, AND PERSONALITY CORRELATES IN YOUNG CHILDREN [1]

Irving Sigel [2]

Paul Jarman [3] and Helen Hanesian [4]

The aims of this paper are to ascertain the styles of categorization employed by preschool and kindergarten children, to determine the extent to which the frequency of such styles, as well as the degree to which such categories of behavior are functionally congruent with intellectual and personality correlates found among older children and adults. The significance of these findings, if such congruence is obtained, would be to indicate the early functioning of such classificatory behaviors, and demonstrate the developmental consistency of styles of classification.

Definition of Concept of Style

The term style has been used to refer to consistency of behaviors, intellectual or expressive, over a variety of tasks and situations. Variation in conceptualization and theoretical bases of the concept have been presented in the literature over the years (Allport, 1939; Broverman, 1961; Gardner et al, 1961; Kagan, Moss, Sigel, 1963; Klein, 1958/Witkin et al. 1962). Each of these investigators has identified kinds of stylistic behaviors by employing perceptual and/or verbal stimuli. In addition they have indicated relevance of cognitive styles to various intellectual and personality variables. The criteria for identification of styles has varied. With the exception of Kagan,

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Moss and Sigel, previous studies have tended not to make use of the stimulus cue properties as delimiting types of response to classes of stimuli. The responses emitted in tasks requiring categorization are not usually categorized on the basis of the cue properties of the stimuli. Thus, the particular aspects of the stimuli that are selected as bases for grouping as well as the characteristic way these stimuli are organized has tended to be underemphasized.

Our purpose is to investigate the bases of judging similarity in preschool and kindergarten children. How children perceive similarity and label such should help understand how classificatory behaviors develop. We are interested in identifying what level of cue is emphasized as basis for classification stimuli. Specifically, we wish to discover the degree to which children tend to emphasize the manifest characteristics of stimuli, or are inclined to focus on the contextual interdependence of items, or utilize inferential bases to determine similarity, since items are responded to as representations of classes of objects or events. These kinds of classifications are reflected in labels employed in denoting groups of commonly judged items.

The following categorical definitions for styles of categorization have been employed:

1. Descriptive - similarities identified on the basis of manifest objective attributes. Sub-classes have been identified as follows:

   (a) Descriptive part-whole-responses denoting observable

parts of an item; e.g., classifying human figures as similar "because they all have feet"; or a group of objects because "they all have wooden handles."

(b) Global: similarities based on the total objective manifestations of the stimuli; for example, a group of male figures classified because "they are men." Age, sex, are other types of descriptive global items.

2. Relational-Contextual - responses denoting functional or thematic interdependence between two or more elements in an array. The interdependence is particular to that situation and not generalizable beyond the immediate. The meaning of each part or each item in the grouping is defined in terms of other items in the grouping; for example, from an array of pictures a horse and a stagecoach are selected because "a horse is used to pull a stagecoach." The items are related in time and place in the particular context of the array. Some of relationships may also be organized along a thematic basis.

3. Categorical-inferential - items classified on the basis of their inferred characteristics of the stimuli, each instance of a grouping representing the category label. Characteristics that may be inferred include functions, or a reference to class membership, particular attributes or geographical location.

(1) Functional: items are grouped on the basis of

inferred use, e.g., a hammer, a saw, an axe, are put together because "these are things to build with."

(2) Class-naming: classification on the basis of class membership, e.g., a cow, a horse, and a sheep are grouped because "they are all vertebrates."

(3) Attribute selection: where only one particular attribute is inferred e.g., a peach, orange and a banana because "they grow."

(4) Location: inference as to where item geographically belongs, e.g., lion, tiger, gorilla grouped together "because they live in a zoo."

These modes of classification are assumed to have stylistic properties, since they are considered to be stable individual preferences in modes of perceptual organization and conceptual categorization of the external environment.

In addition to the styles of categorization, we are also interested in the specific attributes the child selects as the anchor point of his categorization. The descriptive part-whole, descriptive global and the categorical inferential categories lend themselves to such analyses.

Two categories of descriptive-part whole responses were identified: (1) object-structure-- labels denoting commonality

among item on the basis of content structure, e.g.,wheels, legs, etc; and (2) stimulus characteristics-- labels dealing with the non-meaningful characteristics of the stimulus, e.g., line, color, shape.

For descriptive-global responsex, the labels were categorized in terms of occupation and sexual identification.

Moving now to categorical-inferential labels, we identified each of the content categories of functional, class-naming, attribute, location.

Results from Previous Research

A number of studies have been undertaken within this framework to ascertain the distribution and frequency of styles of categorization among children and adults as well as to identify personal social and intellectual correlates of these styles. (Sigel, 1961; Kagan, and Moss, 1962 ; Kagan, Moss and Sigel, 1960 ; Kagan, Moss and Sigel 1963).

The results, in general, indicated that descriptive-part whole and categorical inferential responses increase significantly with age, with relational contextual labels of low frequency and some tendency to decrease with age; the rate and quality of change is a function of chronological age and anxiety level of the child. There is some stability in the employment of descriptive part-whole responses; styles of categorization influence performance on intelligence

and tests, and finally particular personality characteristics are associated with styles of categorization. The employment of descriptive part-whole responses was found to be related to cautiousness, controlled impulse expression, independence and achievement over-action in boys and men; relational-contextual responses related to impulsivity and femininity in men. Little work has been done to date investigating the psycho-social correlates of categorical-inferential approaches.

These results were obtained with boys and girls five years of age or older as well as young adult men and women. The identification and determination of the psychological significance of styles of categorization of four and five-year-old children would shed considerable light on the developmental pattern of this phenomenon.

Procedures

To obtain the children's styles of categorization responses we used a task consisting of twenty sets of three pictures each depicting familiar human, animal and object pictures. Five of the

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Insert Table I

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twenty sets were ambiguous pictures of human figures and the

remaining fifteen sets were made up of black-and-white photographs. The pictures were selected for each set to allow for different bases for organization. Pre-testing had been done to assess the category pull of each of the sets of pictures.

The child was seated at a table and three pictures were placed to his right. A stimulus picture was placed a few inches to his left. To be certain the items could be labelled by the children, we asked them to identify each one. We accepted the name the child gave the item. The children in all cases knew the conventional name for each item. The following were then given:

> "Here is a picture," (E points to the stimulus figure) "and here are three different pictures," (E points to the array of three items. "Pick out from these three the picture that goes with, or is like, this one (E points to the stimulus figure) in any way—and put it with this one (E points to stimulus figure).

After the child makes his selection, he was asked to give the reason he picked the picture. The answer was recorded verbatim.

Following the matching test, the Hidden Figure Test was administered.[6] This task was comprised of items in which the child was required to find a figure embedded in a distracting context. The child was first asked to identify a presentation figure, e.g. a flower. He was then shown the complex figure, with the presentation figure

still in front of him and asked to locate it in the complex figure. Sixty seconds was the time limit in which to locate the figure. The score used was the time needed to locate the figure correctly.

To ascertain relationships between the child's personal-social behavior and the styles of categorization ratings were obtained from the two teachers, each of whom worked closely with the children. They rated the children on the following thirteen variables taken from the Sarason-Davidson Teacher Rating Scale: anxiety, independence, emotional control, communicability, cautiousness, relaxed, ambition, daydreaming, learning rate, retention of material and paying attention.

Sample

Forty-six five-year-old children, twenty-four girls and twenty-two boys, attending a private kindergarten were used in the study. In addition, twenty-one children, eleven girls and ten boys, made up the four-year-old group. [7] All children were middle to upper middle class white, and between ages of 4:0 - 4:11; 5:0 - 5:11. Stanford-Binet scores of the five-year olds were available since this was an entrance requirement to kindergarten. [8]

Results

Frequency of styles of categorization

Evidence of the availability of each of the major styles of categorization was found among the four and five-year-old boys and girls.

As can be seen from Table 2 the descriptive part-whole responses were the most frequent for each age and sex group; followed in descending order by relational-contextual, categorical-inferential and descriptive-global responses respectively.

Insert Table 2 about here

Although the relative position of the particular style of categorization is identical, there are differences in magnitude within and between sex and age groups. No significant differences were found between four and five-year-old boys, whereas girls increased significantly in the use of descriptive global labels, ($t=2.33 < .05$) and showed trends toward increase in categorical inferential responses. Girls also tended to use fewer categorical-inferential labels at age four than boys ($t= 1.78 < .10$) but by age five the difference is virtually zero.[9]

Thus, for boys, the pattern of styles of categorization were consistent from age four and five, whereas girls showed relatively more change.

Content analysis of descriptive and categorical responses

It will be recalled that at the outset we indicated interest in the kinds of cues children employ as the basis of their cate-

gorization. To determine the kinds of cues the child employed, the contents of the descriptive and categorical-inferential responses were analyzed.

Two types of descriptive part-whole responses were defined previously as object structure, and stimulus characteristics.

In Table 3 we have summarized the percentage of each type of descriptive part-whole labels employed by all the children. Stimulus characteristics were used more often by four-year-old boys than four-year-old girls; five-year-old boys used this type label more frequently than five-year-old girls. Both groups increased in their use of object structure labels. None of the differences are significant.

Insert Table 3 about here

These results indicate that over one-half of the responses of the four-year-old boys deals with stimulus characteristics, whereas for girls only about one-third are of this type.

Turning now to a content analysis of the descriptive-global responses, which were categorized according to sexual and occupational identification eighty percent of the four-year-old boys and forty-five percent of the girls employed descriptive-global labels of sexual identity. ($z=1.77$ $p<.08$). At the fifth year, however, a decrease by the girls. ($z=1.69$ .09) The boys

increased predominantly but not significantly in labels involving occupation. The question as to why girls showed increase in the use of sex labels is surprising since such a discrimination should be learned very early.

Insert Table 4 about here

Moving now to categorical-inferential labels, there were four sub-categories (See Table 5) of function, class-naming, attribute selection, and location. The results are summarized in Table 5.

Insert Table 5 about here

At ages four and five, categorical-function labels were used more frequently by boys, than girls. The girls increase in their use of such labels from 10 to 45 percent ($z=2.07$ $p<.04$). The sex differences disappear at the kindergarten level.

Class-naming and functional labels were most frequently employed by all children. These types of categorical-inferential responses were used so much perhaps because of their high frequency in everyday language e.g., such words as fruit, animals. Function may increase in frequency for the same reasons; a phenomenon also reported previously (Sigel, 1953). In general, however, the children were able to utilize some inferential labels appropriately when organizing

familiar material. They do so, however, with relatively low frequency compared to other approaches indicating that categorical inferential is not too prevalent at these age levels.

Response Time and Styles of Categorization

One of the major findings reported by Kagan, Moss and Sigel (1963) was that the users of descriptive part-whole responses (descriptive-analytic) were consistently slower in their response time than the "non-analytic" users.[10]

Data were available only from the five-year-old children for an examination of response time for each of the styles of categorization. For the boys, the longest response time was with descriptive part-whole responses, and fastest with the descriptive global (See Table 6). These differences, however, were slight and were not statistically significant.

Insert Table 6 about here

Girls show a pattern different from boys. For girls, there is considerable variability, with response times for descriptive part-whole responses being significantly longer than response time for relational-contextual labels. ($t=2.00$ $p<.05$) as well as with categorical-inferential category. ($t=2.80$ $p<.05$). Thus we find that girls do show a different pattern of response times.

Boys do not show any significant differences among their response times. All the girls' response times, however, tend to be faster than those of the boys, with but one difference statistically significant, i.e. categorical-inferential ($t=2.48$ $p<.02$) (See Table 6).

What these results indicate is that even though boys and girls were similar in the frequency with which they emit particular labels, the psychological ease with which they responded differed. We shall have occasion to discuss this issue in the context of the relationship between labelling behavior and personal-social characteristics.

Relationship between Content Categories and IQ

We found few significant relationships between the descriptive part-whole, descriptive (global) and relational-contextual approaches and the IQ as measured by the Stanford-Binet.

The relationships between IQ and the use of descriptive part-whole and relational-contextual labels were not statistically significant for boys and for girls.

Turning now to the categorical-inferential category, we found no relationship between the total categorical-inferential frequencies and IQ for boys, but a higher--albeit insignificant--one for girls. (.32). With the class-labelling category, however, a sub-category of categorical-inferential, we found an increase in the positive direction for both groups, with the correlation significant for girls only ($r=.46$ $p<.05$).

In general, the role of IQ is unclear. Of interest and need for further study is the question of explaining why we find different trends for boys and girls. No doubt this indicates that particular styles of categorization function differently for boys than for girls.

The Relationship Between Cognitive Style Categories and Perceptual Ability

The Hidden Figures Task was used as a test of perceptual discrimination testing the ability to identify and differentiate a figure confused by surrounding stimuli. The score used was time needed to discover the Hidden Figure. The particular stylistic labels employed did not relate to the speed with which boys or girls found the Hidden Figure (See Table 7). This is contrary to our expectations since we would expect the greater the use of descriptive part-whole responses, the faster the location of the Hidden Figure.

Insert Table 7 about here

To provide a more sensitive test of the relationship between the descriptive part-whole approach and the speed with which Hidden Figures are found, we divided the boy and girl groups into High and Low on the basis of descriptive part-whole use.

The results, summarized in Table 8, indicate that the boys above the median were slower in finding the Hidden Figure than the

boys below the median; whereas, for girls, the results were reversed.

Insert Table 8 about here

The boys above the median are significantly slower than girls above the median ($t=3.34$ $p < .05$). No difference is found between boys and girls who are below the median.

Thus, we can conclude that the high use of descriptive part-whole responses does bear some significance to the speed of response in a perceptual task. There is an interaction effect, however, with the sex of the subject. For boys high frequency of descriptive part-whole responses reflect a slower perceptual approach, whereas, for girls it reflects a rapid one.

Another factor that may be influencing the performance on the Hidden Figure Task is the IQ level. We found that in general the higher the IQ the lower the response time. The correlations, however, were not significant, ($r=25$) for boys but were $-.49$ ($p < .05$) for girls. The brighter girls tend to locate the Hidden Figure more readily.

The Relationship between Cognitive Style Categories and Social-Emotional Behavior

To this point we have presented the correlates of labelling behavior with intellectual and perceptual activities. Let us now

turn to an examination of the relationship between the styles of categorization and social-emotional behavior variables, as expressed in the nursery school and kindergarten environment.

Insert Table 9 about here

In Table 9 we have summarized the relationships between each of the cognitive style categories and the teacher ratings. It will be noticed that we analyzed results for the boys and girls separately, even though we did not have significant differences between mean scores in many of these categories. The rationale for this comes from previous evidence demonstrating that we can not assume that a particular variable functions similarly for each sex group (Kagan, Moss, Sigel, 1963; Sigel, 1961).

Our experience finds further confirmation in the analyses of relationships between styles of categorization and personal-social variables; each of the style categories having different correlates for boys than for girls (See Table 9). We can summarize the results as follows: boys employing the descriptive part-whole approach tend to be relaxed and control their emotionality; girls, on the other hand, tend to be non-cautious or impulsive, daydreaming and do not pay attention.

The relationships obtained between descriptive global labels and personality correlates for boys yield different trends than for girls. For boys we found a positive correlation with independence and a

trend toward the ability to retain material; however, for girls we found a somewhat similar set of trends as we have for their use of descriptive part-whole responses. The relationships here tended to indicate that those girls who use the descriptive-global labels tend to be non-anxious, uncontrolled emotionally, not cautious, relaxed, not ambitious, and non-attending. We found, in general, the same kinds of trends for each of the descriptive categories for girls and for boys, although the magnitudes varied.

Turning to the results with the relational-contextual labels, for boys a negative relationship was obtained between the use of such labels and emotional control. High, but not significant correlation, were also found with the lack of masculinity. It will be noted that the trends found here for the boys are concordant with those reported by Kagan, Moss and Sigel (3) where men using relational-contextual labels tend toward dependency, impulsivity, tension, inattentiveness and femininity. For the girls, the trends tended to be in reverse directions.

For the categorical-inferential labels, we found the greatest consistency between boys and girls. Most of the obtained correlations were in a similar direction, with the notable exception of the anxiety and emotional control variable, where girls using such modes of classification tend to be anxious, while the boys do not; the girls also differ in direction on the emotional control variable from boys.

Discussion

This study provides many interesting findings but also raises some perplexing questions. The fact that children of the age levels studied in this investigation employ styles of categorization in all the categories makes their responses comparable to the results obtained with older children and adults. The relationships obtained between styles of categorization and personal-social characteristics are congruent with previous findings with older age samples. These results are indeed exciting. On the perplexing side are those findings related particularly to sex differences as well as the role of intelligence.

Turning initially to the results bearing on the kinds of styles of categorization, we were surprised to find the relative high frequency of descriptive part-whole responses since these kinds of responses are age related. Could, we might ask, the instructions have influenced the results? Instructing the children to select items on the basis of similarity, might focus their attention on descriptive-part whole which would serve as a basis for perceiving similarity. Pilot work in which instructions asked children to select "those things that belong together" as compared to those things which are alike in any way resulted in no differences in frequency of part-whole responses.

In effect, then, we can conclude from this study that children

as young as four years of age produce labels that are descriptive part whole, and are capable of labelling on the basis of the other stylistic categories.

Whether the use of particular approaches to categorization serve similar adaptive functions or reflect similar underlying processes is still an open question. We did find, that the content of the particular categorization styles varies as a function of age and sex. We do not know, however, what the developmental trends of the content are beyond the groups studied here, since to date no similar analysis has been reported. Assuming that the content differences do not signify a difference in cognitive process, i.e. a part-whole approach whether dealing with object structure or characteristics has the same psychological underpinnings, we can conclude that this particular type approach does increase with age. The change in content, however, is in the direction of increased meaningfulness and complexity and may explain the continued apparent increase of descriptive part-whole responses. The changes observed here over a one-year period are consistent with what has been found with older children in different contexts, (Sigel, 1953, 1961). Further the attention to details, has also been found to be a prelude to conceptual approaches (Sigel, 1953).

The steady increase with age in the use of categorical-inferential grouping has also been reported previously (Sigel, 1953) and here again the specific content varies--the shift being in the direction

of class labelling and inferred motivational and value labels. These developmental trends are not surprising, since this is what we have been led to expect by a number of previous studies (Sigel, 1954, Ausubel, 1963, Sigel, 1961).

Of course still to be identified are the antecedents for the three styles of categorization to account not only for their frequency but the variation in frequency among boys and girls, or among children of different ages. The children in this sample have relatively homogeneous social and educational backgrounds. We can assume that the linguistic experiences are quite similar. Knowledge of items in the task and experience with them probably varies but little, yet the frequency with which children employed class labels varied considerably. The issue of the source of individual variation is still open.

Related is the perplexing question arising from the findings of the sex differences. These results are surprising not so much by virtue of the frequency of particular styles of categorization, but of the correlates and concomitant characteristics surrounding them. Why for example do similar personality correlates relate in opposite directions for the boys as compared to the girls only in the descriptive and relational-contextual categories, but not the categorical inferential? Why for example do boys have slower reaction times than girls when employing categorical-inferential labels? Why are boys slower than girls in finding the Hidden Figure?

Boys and girls differed in the speed of response with descriptive-part-whole response, yet both groups tended to be slower. The relationship between latency times with descriptive part-whole response and personality correlates are different for each of the sex groups. The boys tend to be cautious, whereas the girls tend to be impulsive. When using descriptive part-whole labels, the individual be it boy or girl must respond slower than with other styles. For boys, it may be an extension of their characteristic slowness, whereas for girls this is not the case. In fact for them it may be counter to their inclinations.

The answers to the "why" of these results may reside in studies which focus on biological variables such as receptivity to sensory stimuli, and consequent determination of whether differences in relevant functions are intrinsic to biological operations of girls and boys. It may well be that biological variables interacting with profound and subtle socialization experiences produce the type of differences we found.

The role of the IQ should not be overlooked. At least it is an open question. Only one of the IQ correlations is of consequence, the positive and significant findings between IQ and class labelling for girls ($r=.46 p < .05$). How is mental ability involved and why is it not more related? After all, the subjects were asked to perform categorization tasks, which are generally considered indexes of intelligence. Yet, the most powerful predictive measure of children's intelligence, the Stanford-Binet, did not provide predictions for

the boys and for the girls. Whether this finding is an artifact of the relative narrow range of IQ's or style scores or whether in fact the two tasks have differential significance is still to be determined.

Finally the most exciting and potentially significant results are those relating styles of categorization with the personality ratings. The fact that the results, especially for boys, are so congruent with findings obtained with older boys and men, provides us with a remarkable continuity. The findings in this study point to different developmental rates of styles of categorization for boys and girls. The implications of these findings are considerable for developmental research. This may mean that styles of categorization reflect a complex of behavior, in which a number of correlates function, at different levels. For example, how do we explain the relationship between emotional control and the use of descriptive part-whole response? Is control a necessary condition for use of descriptive part-whole responses? The answer is ambiguous, since our results indicate it is so for males, but not for females. Since this is the case, it is not that particular response which can be said to require emotional control, rather, it may well be part of a syndrome functional only for males.

An additional set of findings is relevant here--it will be recalled that the descriptive and relational contextual approaches showed differential trends and relationships for boys and girls, but

virtually all the personality correlates of categorical-inferential labels were in the same direction. This leads to further speculation regarding sources for the particular stylistic preferences. Could it be that the descriptive and relational-contextual approaches have their roots in constitutional variables and are expressions of biological dispositions, whereas employment of categorical-inferential labels are indicative of common linguistic pattern? The particular items used may be employed with such high frequency and popularity that they minimize difference.

Our results do throw into relief a number of significant issues, e.g. the sex differences in performance and in development, the consistency of style correlates, and the relative significance of biological explanation for antecedents of style. (Sigel, 1961)

SUMMARY

This study set out to determine the types of styles of categorization employed by preschool and kindergarten children as well as the intellectual, perceptual, and personal-social correlates of such categorizational behavior. Forty-six five-year-olds, 24 girls and 22 boys, and 21 four-year-olds, 11 girls and 10 boys, participated.

Results indicate that styles of categorization found with older subjects occurred with the young children. The types were Descriptive Part-Whole, Descriptive-Global, Relational-Contextual, and Categorical-

Inferential.

The frequency of styles of categorization was in descending order with a pattern similar for boys and girls at ages four and five. The order was Descriptive Part-Whole, Relational-Contextual, and Categorical-Inferential, and Descriptive-Global. Differences in number of responses within each category were found. Four-year-old boys used more categorical-inferential responses than four-year-old girls, and five-year-old used more descriptive-global responses than four-year-old girls. No other significant sex and age differences were found.

Content analyses of the Descriptive Part-Whole, Descriptive-Global, and Categorical-Inferential categories were made. It was found that two types of Descriptive Part-Whole responses can be identified: object structure and stimulus characteristics--the former referring to meaningful content similarity, the latter to non-content aspects. Five-year olds, boys and girls, use more object-structure labels than four-year olds. Boys, however, use more stimulus-characteristics at age four than girls, and also a year later.

Descriptive-Global content showed age and sex differences also, boys increasing in the use of labels denoting occupation.

For the Categorical -Inferential, five subcategories were used: Location, Inferred Attributes, Class-Naming, Function, and Inferred Affect. At each age level, boys use functional labels more frequently. Girls use class names most frequently at age four, but at age five such labels rank second to function.

Descriptive Part-Whole responses required longer response time for girls as well as for boys, but boys were generally slower responders irrespective of label emitted than girls.

The Stanford-Binet IQ did not relate significantly to any stylistic category for the boys, but for girls, a positive and significant relationship was obtained with class-naming, a Categorical-Inferential type response.

Although no relationship was obtained between any of the stylistic categories and the speed with which Hidden Figures were obtained, boys above the median in the use of Descriptive Part-Whole labels were slower in locating the Hidden Figure than boys below the median. For girls, the results were reversed.

Personal-social correlates of the stylistic approaches were as follows: that for boys, employment of descriptive part-whole responses related to relaxed attitude and control of emotionality, whereas girls tended to be non-cautious, daydreaming, and not paying attention. The use of descriptive-global responses for boys related positively to independence, and retention of material; for girls results were similar to descriptive-part whole. With relational-contextual use, a negative relationship with emotional control for boys was found but no significant relationships for girls and categorical-inferential use for boys and girls indicated a positive tendency toward retention of material, paying attention and communicability. Other trends are presented and discussed.

A discussion of these results focusing on the theoretical implications, for cognitive development as well as the significance of the sex differences follows.

FOOTNOTES

1. Expansion of a paper read at the American Psychological Association's Annual Meeting, Philadelphia, Pennsylvania, 1963.

2. The authors wish to acknowledge the enthusiastic co-operation of Mr. John Chandler, past Headmaster, Mesdames P.G. Eriksen and M.C. Schwenk, teachers, and the children, of the Grosse Pointe University School, Grosse Pointe Woods, Michigan. Partial support for this project came from USPHS Grant M-2983. It is also part of the program of the Center for the Study of Cognitive Processes, Wayne State University.

3. Now on the faculty of Ball State Teachers' College, Muncie, Indiana.

4. Now at the Association for Crippled Children, New York City, N.Y.

5. This type of response has been referred to by Kagan, Moss, and Sigel (3) and Sigel (11) as Descriptive Analytic. Since analytic suggests a cognitive process, it was decided to use the term Part-Whole to denote the amount of the stimulus used in the descriptive response.

6. This task was constructed by Dr. J. Kagan, Fels Research Institute.

7. The four-year-old group was tested in 1959-60. Five boys and eight girls were part of the five-year-old groups. We did not

include the "longitudinal" children in comparisons between the four a nd five-year olds. We did include them in those analyses on perceptual, IQ, and personality variables. We did statistical analyses to determine changes from one year to the next. We found no significant differences except for an increase in Descriptive Global labels. This is consistent in the main with our cross-sectional analyses.

8. Stanford-Binet, Form "L" tests were administered as part of the school admission procedure.

9. The formula used to compute the "t" scores was taken from Wert, J.E. The formula was $t = \sqrt{\frac{k_1 k_2 (N-2)(\bar{X}_1 - \bar{X}_2)^2}{N(\sum x_1^2 + \sum x_2^2)}}$

10. Intercorrelations of response times showed consistent patterns for boys and girls. Response times for each of the categories are independent of each other.

BIBLIOGRAPHY

Allport, G.W., Personality: a psychological interpretation, N.Y. Henry Holt & Co., 1937.

Ausubel, P., The Psychology of Meaningful Verbal Material, N.Y., Green & Stratton , 1963.

Broverman, D.M., Cognitive styles and intra-individual variation in abilities. J. Pers., 1960, 28, 240-256.

Gardner, R., Holzman, P.S., Klein, G.S., Linton, H., and Spence, D.S., Cognitive control: a study of individual consistencies in cognitive behavior. Psychol. Issues, 1: No. 4, 1959.

Kagan, J., Moss, H.A., and Sigel, I.E., The psychological significance of styles of conceptualization. In J.F. Wright and J. Kagan, (Eds.) Basic cognitive processes in children. Monogr. Soc. Res. Child Development. 1963, 28 (2), 73-112.

Kagan, J., Moss, H.A., and Sigel, I.E., Conceptual style and the use of effort labels. Merrill-Palmer Quarterly, 1960, IV: 4, 261-278.

Klein, G.S., Cognitive control and motivation, in Lindzey, G., ed., Assessment of Human Motives. N.Y. Rinehart & Co., Inc., 1958.

Sarason, S.B., Davidson, K., Lighthall, F., Waite, R., and Ruebush, B., Anxiety in Elementary School Children: A Report of

Research. N.Y. Wiley, 1960.

Sigel, I.E. The developmental trends in the abstraction ability of young elementary school children. Child Dev., 24: June 1953, 131-144.

Sigel, I.E., The dominance of meaning. J. Of Genet., sych. 1954, 85, 201-207.

Sigel, I.E., Cognitive style and personality dynamics. Interim progress report for National Institute of Mental Health, M. 2983, 1961.

Werner, H., Comparative Psychology of Mental Development, rev. ed. N.Y.: Follet Publishing Co., 1948.

Wert, J.E., Neidt, C.O., Ahmann, J.S., Statistical Methods in Educational and Psychological Research, N.Y.: Appleton-Century-Crofts, Inc., 1954.

Witkin, H.A., Dyk, R.B., Faterson, H.D., Goodenough,D.R., and Kays, S.A., Psychological Differentiation. N.Y.: Wiley, 1962.

TABLE 1

STRUCTURED LABELING TASK

Presentation Item:	Choice Items:
1. Man in suit holding pistol in pointing position.	a. Man in suit holding black bag with overcoat draped over same arm. b. Man in uniform with one arm in a throwing position. c. Woman in skirt and blouse with a knife in her hand at her side.
2. Nurse holding an article draped over her arm.	a. Old woman in dress and apron holding a pie in both hands before her. b. Man in academic gown with hands clasped before him. c. Woman in floor length gown with hands at her sides and ar object in one hand.
3. Woman in wheelchair with a pallet in one hand painting with a brush at an easel with the other.	a. Man in shabby-type clothing with a hat held at his side in one hand and the other outstretched before him palm up. b. Nurse holding an article draped over her arm. c. Man with one leg leaning on a crutch.
4. Man in suit holding black bag with overcoat draped over same arm.	a. Baby sitting with arms upraised holding an object in one hand. b. Policeman in uniform with hands on hips. c. Nurse holding an article draped over her arm.
5. Boy in short pants with his arms raised in front of him.	a. Old woman in dress and apron holding a pie in both hands before her. b. Man in suit holding black bag with overcoat draped over same arm. c. Boy in short pants with one hand raised to face and the other pointing to a broken toy.

TABLE 1

Presentation Item:	Choice Items:
6. Tomato	banana, orange, pear
7. banana	greenbeans, grapes, celery
8. bread	tomato, apple, ham
9. duck	fish, camel, hen
10. cow	elephant, horse, sheep
11. truck	dog, horse, sheep
12. chair	dresser, table, rocking chair
13. bed	cradle, chest, lamp
14. tractor	engine (railroad), rocketship, boat
15. stagecoach	sailboat, airplane, jeep
16. ranch	stagecoach, horse, cowboy
17. neutral fireman	fire station, neutral soldier, neutral policeman
18. smiling cowboy	smiling man, neutral policeman, ranch
19. neutral baby	playpen, neutral girl, neutral man
20. smiling nurse	neutral nurse, smiling stewardess, sad stewardess

TABLE 2

MEAN AND t VALUES OF COGNITIVE STYLE SCORES
OF FOUR AND FIVE YEAR OLD BOYS AND GIRLS

	4th year BOYS (N=11)	5th year BOYS (N=17)	t	4th year GIRLS (N=10)	5th year GIRLS (N=16	t
Descriptive Part-Whole	6.00	7.00	.50	6.80	6.81	.00
Descriptive Global	.91	2.18	1.36	.80	2.75	2.33**
Relational-Contextual	5.82	4.71	.82	3.70	4.56	.81
Categorical-Inferential	3.64	4.18	.51	2.00	4.31	1.78*

*p < .10 **p < .05

TABLE 3

PERCENTAGE OF DIFFERENT LABELS EMPLOYED BY FOUR AND FIVE YEAR OLD CHILDREN WITHIN THE DESCRIPTIVE PART-WHOLE DIMENSION

	FOUR YEAR OLDS		FIVE YEAR OLDS	
	Boys (N=11)	Girls (N=10)*	Boys (N=22)	Girls (N=24)
Clothing	.16	.16	.14	.15
Position	.01	.00	.12	.03
Human Body Parts	.07	.03	.01	.04
Object Structure	.10	.18	.27	.40
Object Characteristics	.57	.37	.45	.36
Size	.09	.27	.01	.02

* No significant differences were found between boys and girls within age groups.

TABLE 4

PERCENTAGE OF LABELS EMPLOYED BY FOUR AND FIVE YEAR OLD CHILDREN WITHIN THE DESCRIPTIVE-GLOBAL DIMENSION

	FOUR YEAR OLDS		FIVE YEAR OLDS	
	Boys (N=11)	Girls (N=10)	Boys (N=22)	Girls (N=24)
Structural Attributes	.09	.27	.04	.02
Occupation	.09	.18	.24	.18
Sex	.82**	.45*	.69	.75*
Identification	.00	.09	.02	.05

* Difference $p =< .09$

** Difference .82-.45 $p < .08$

TABLE 5

PERCENTAGE OF DIFFERENT LABELS EMPLOYED BY FOUR AND FIVE YEAR OLD CHILDREN WITHIN THE CATEGORICAL-INFERENTIAL DIMENSION

	FOUR YEAR OLDS		FIVE YEAR OLDS	
	Boys (N=11)	Girls (N=10)	Boys (N=22)	Girls (N=24)
Location	.20	.35	.16	.07
Inferred Attributes	.13	.15	.04	.03
Class Names	.33	.40	.34	.42
Function	.35	.10	.45	.48
Inferred Affect	.00	.00	.01	.00

TABLE 6

MEAN RESPONSE TIMES OF FIVE YEAR OLD CHILDREN FOR EACH OF THE COGNITIVE STYLE DIMENSIONS

	BOYS	GIRLS	t
Descriptive Part-Whole	18.00	15.17	1.78
Descriptive Global	14.86	11.72	1.28
Relational-Contextual	16.11	13.21	1.40
Categorical-Inferential	17.71	10.55	2.48**

** $p < .02$

TABLE 7

RELATIONSHIP BETWEEN TYPES OF LABELS EMPLOYED BY FIVE YEAR OLD CHILDREN AND SPEED IN LOCATING HIDDEN FIGURES

	BOYS (N=22)	GIRLS (N=24)
Descriptive Part-Whole	.05	.06
Descriptive Global	.23	.23
Relational-Contextual	.16	.09
Categorical-Inferential	-.04	.12

TABLE 8

DIFFERENCES BETWEEN HIGH AND LOW USERS OF
DESCRIPTIVE PART-WHOLE LABELS AMONG FIVE YEAR OLD CHILDREN

	MEAN R.T. OF HIGH D.P.W.	MEAN R.T. OF LOW D.P.W.	t	p
Boys (N=12)	20.29	14.21 (N=10)	1.92	$< .10$
Girls (N=11)	12.09	16.76 (N=13)	2.11	$< .05$

TABLE 9

RELATIONSHIP BETWEEN COGNITIVE STYLE DIMENSIONS AND TEACHER RATINGS OF BEHAVIOR OF FIVE YEAR OLD CHILDREN

	DESCRIPTIVE				RELATIONAL-CONTEXTUAL		CATEGORICAL-INFERENTIAL	
	Part-Whole		Global					
	Boys (N=22)	Girls (N=24)	Boys	Girls	Boys	Girls	Boys	Girls
Non-Anxious	.29	.16	.09	.41**	-.11	.15	.13	-.32
Independent	.10	-.24	.40**	.00	-.15	.17	.26	.25
Controls Emotion	.45**	-.20	.13	-.40**	-.54**	.16	.23	-.01
Communicability	.11	-.16	.24	.09	.01	.06	.33	.34*
Cautious	.14	-.43**	-.31	-.35*	-.25	.09	.00	.23
Relaxed	.37*	-.13	.18	.44**	-.15	.16	.39*	.05
Ambitious	-.02	-.33	.21	-.41**	-.15	-.06	.14	.36
Doesn't daydream	.16	-.49**	.16	-.13	-.26	.14	.21	.44**
Learns Quickly	.20	-.13	.18	-.10	-.27	-.24	.30	.39*
Retains Material	.28	-.14	.35	-.05	-.07	-.16	.40**	.37*
Pays Attention	.31	-.40**	.15	-.42**	-.23	.02	.32	.34*

*p < .10 **p < .05